Rocky Flats Environmental Technology Site

Building 776/777
Area V

Decontamination Efforts of the Size Reduction Vault (SRV)

Survey Unit:
776005

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July 2004

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ADMIN RECORD

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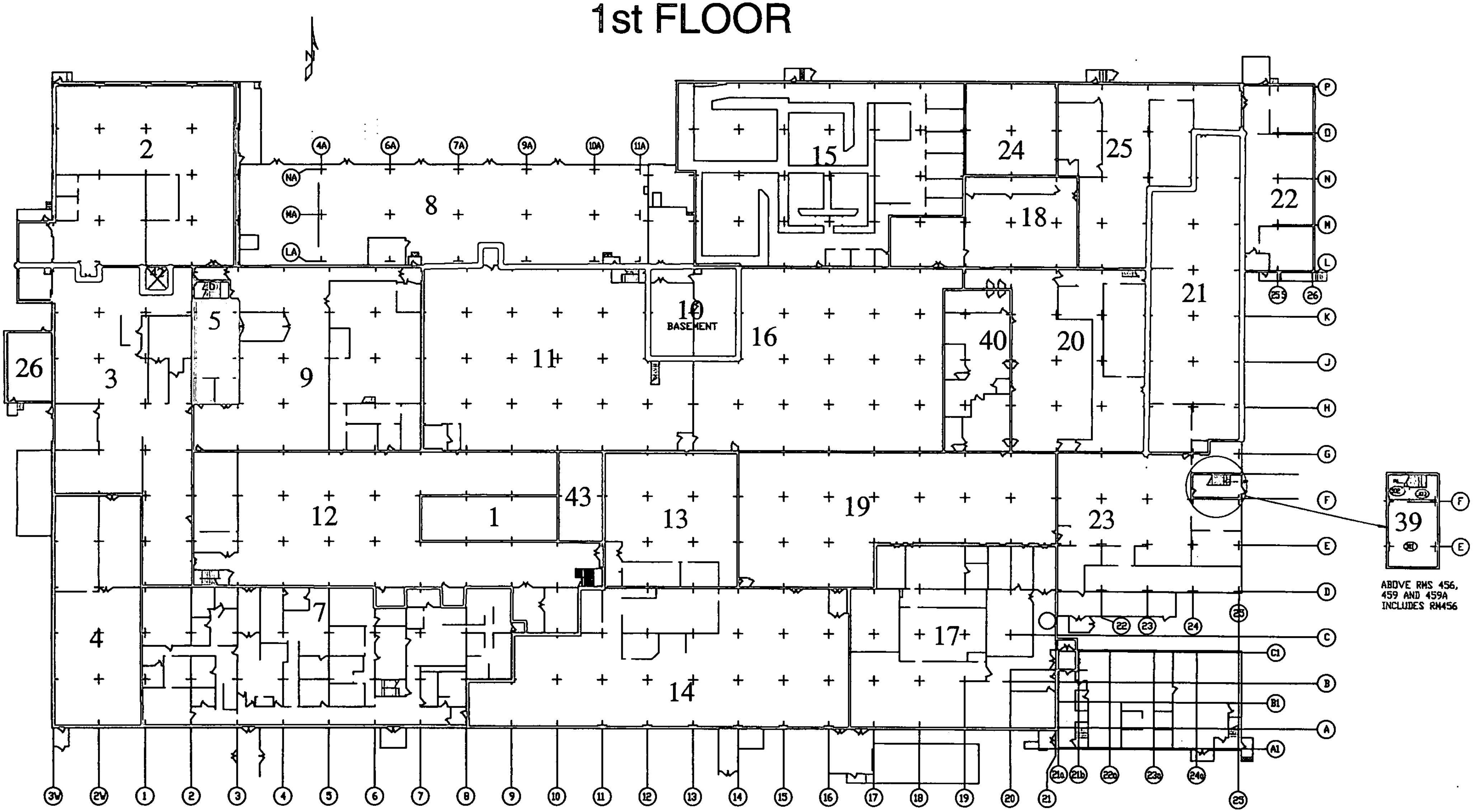
B776/777 SURVEY UNITS
1st FLOOR



Decontamination Efforts of the Size Reduction Vault (SRV) in Survey Unit 776005

July, 2004

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1) Scope

This report summarizes the in-process characterization surveys and decontamination efforts performed in survey unit 776005. This report will also propose the final disposition of the SRV.

a) Historical Review

The area encompassed by this survey unit is referred to as the Size Reduction Vault (SRV). Room 146 was part of the original construction of the building. Rooms 146A- C was added as part of the cleanup after the 1969 fire. Room 146C was removed prior to survey, The area formerly occupied by 146C is now part of survey unit 776009 in room 134.

Room 146 was originally designed and used as a vault for plutonium buttons. A chainveyor entered Room 146 on the east wall. Buttons from the vault were placed into the glovebox line for casting. After the 1969 fire, the glovebox and vault positions were removed. Room 146 was converted into an area for the cleaning and size reduction of equipment removed during the fire cleanup. Once the fire cleanup was completed, the SRV was used to wash leaded gloves and metal wastes in a ball mill and to consolidate and to crush soft wastes and drums for repackaging. Liquid wastes from the washing operations were filtered and sent to tanks in room 134. All work in room 146 was performed in supplied air. Rooms 146A and 146B were used for container and personnel staging. Room 146A was also used for headspace gas sampling. Room 146B was also used for container repackaging.

In early 2004, all equipment and asbestos containing materials were removed from the SRV.

b) Methods and Techniques

Surfaces were evaluated for potential contamination under coatings using sodium iodide (NaI) detectors attached to single channel analyzers windowed for the 59 keV gamma–ray (^{241}Am).

Measurements were taken at 30 cm and on contact. For the 30 cm measurements on the floors and walls, the survey technique involved scanning at least a 3 foot radius around each grid location to find the highest reading and then taking the measurement at that point.

The first two sets of survey measurements on floors were taken on an established 10-ft by 10-ft grid pattern. The last survey was performed using randomly selected points on the floors and lower 8 feet of the walls.

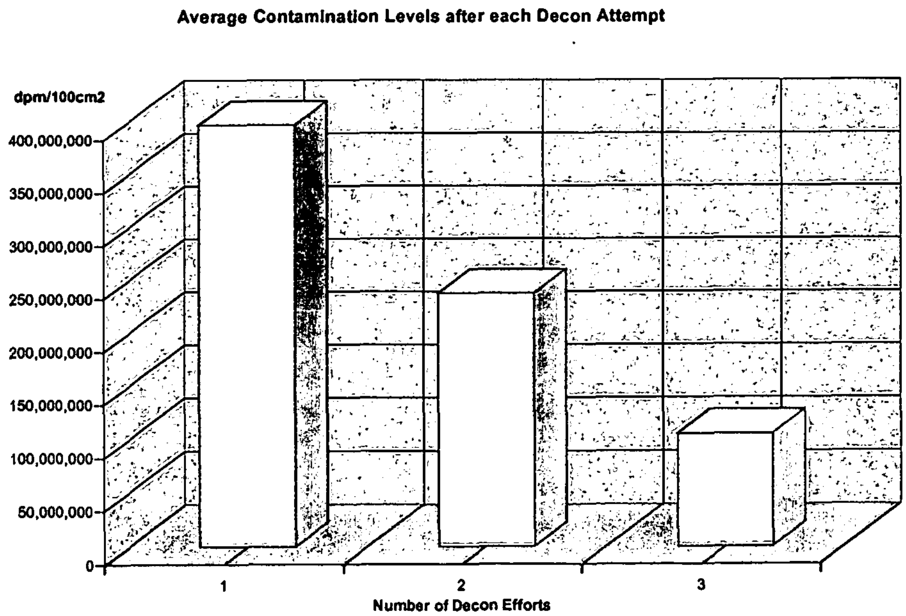
Concrete samples were collected from the upper one half inch of the floor and from the outer one inch of a hotspot on the wall. These samples were analyzed using a high purity germanium detector.

2) Results

a) Floors

The 1969 fire impacted the floors of this survey unit. There is evidence that liquid spills and other contamination events during equipment decontamination activities and size reduction efforts have added to the contamination originally deposited by the fire. Two locations were chip sampled to a depth of two inches. Sodium Iodide (NaI) readings indicate that the majority of the contamination is in the top one half inch of the floor, but elevated readings were detected even at 2 inches deep in the two "hotspots" that were sampled. The first survey of the floors with NaI detectors was performed after all of the loose paint and debris had been removed from the floor with shovels. Two more surveys were performed after two passes with the hydrolazing equipment. While the hydrolazing did reduce the overall contamination levels, they are still higher than those encountered anywhere else in B776. A summary of the surveys performed on the floors can be seen in Figure 1.0 below.

Figure 1.0 Summary of Post Decon Surveys



b) Walls

Only the lower portions of the walls could be surveyed in this survey unit. Because of the relatively high loose contamination levels, it was not prudent to bring manlifts into the SRV to survey its upper portions. Equipment, which had been used for asbestos abatement, had already been removed prior to the survey.

The walls were scanned and found to have levels similar to those found on the floors in the lower two feet. Contact readings taken at four and eight feet indicate that contamination levels are highest near the floor and decrease with elevation.

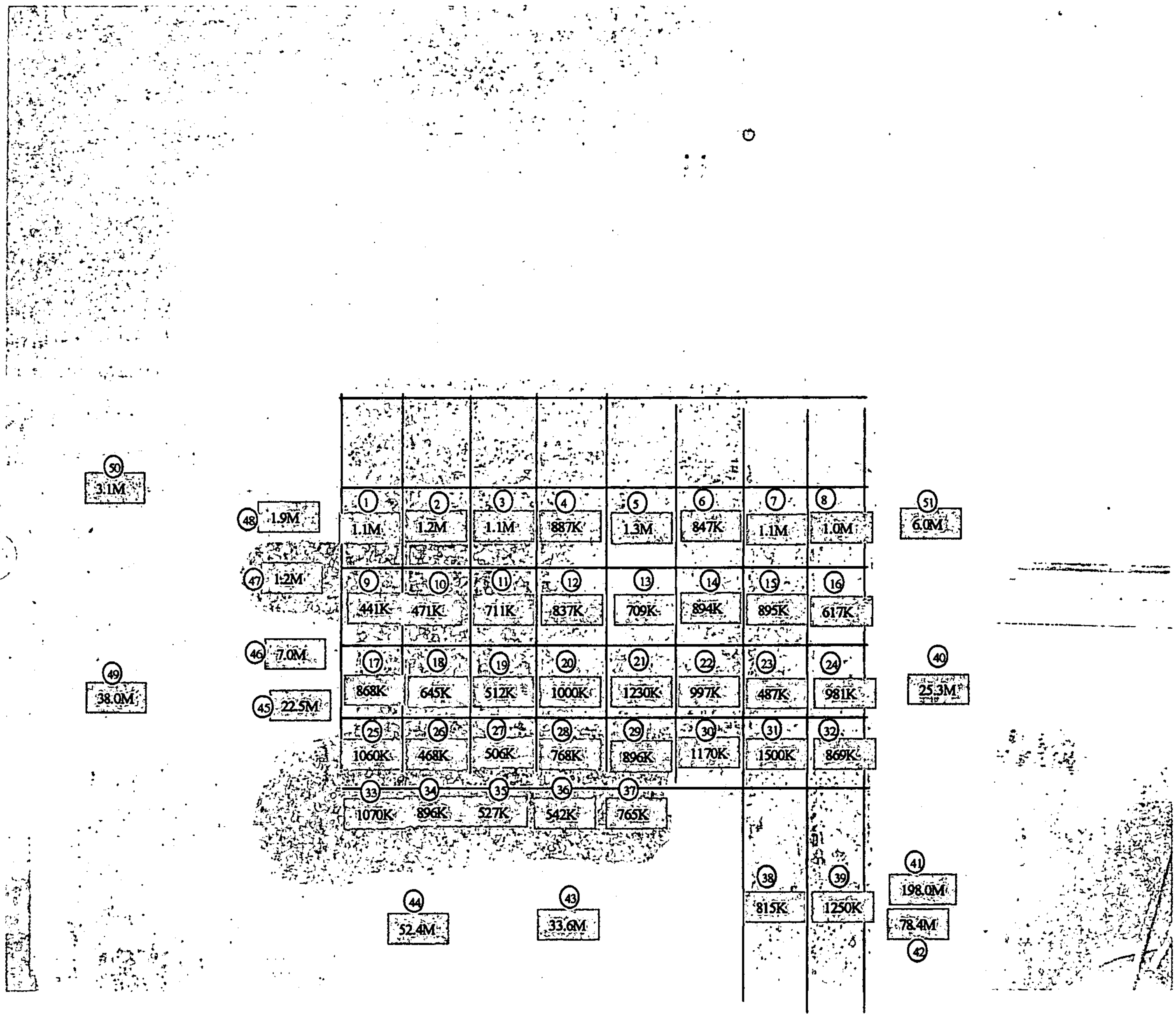
The block walls, which form rooms 146A and 146B, could not be accurately surveyed because of the high background levels in the SRV. Levels reported for these walls are over estimated.

All other walls are structural and are characterized in this report with contact readings taken at 4 feet and 8 feet from the floor.

A small area of the west wall was selected for a test to determine the depth of the contamination. This area was hydrolazed to a depth of approximately one-inch. A grid was overlaid on this area and contact readings were taken at each grid location. The results of this survey can be seen in Figure 2.0. The deeply hydrolazed portions of the wall appear to be darker than the rest of the wall. The numbers in the overlaid grid are how many dpm/100cm^2 there are in each grid.

The test indicates that even if the walls were hydrolazed to more than an inch deep, the ALARA goals for decontamination would not be met.

Figure 2.0 Results of deep Hydrolazing West Wall



c) Ceilings

The sheet rock ceiling of the SRV was removed prior to the in process survey. The remaining metal ceiling has not been surveyed. The surveys of the walls indicate that contamination levels decrease with elevation. A layer of wallboard has protected the ceilings for at least 34 years. The ceiling will become part of Survey unit 776009 when the walls and floor of SRV are removed. In-process and final survey of the ceiling will be included in survey unit 776009 packages.

3) Summary

Average contamination from random survey

Surface	dpm/100cm^2
Floors*	105,431,353
Walls *	50,744,711
Ceilings**	N/A
Inaccessible Areas ***	N/A
Total ASCVu	56,793,923

* Average from attached data, see map for wall and floor location numbers

** No ceiling data available, average from floors and walls used to calculate $ASCV_u$

*** No inaccessible areas identified.

Inventory from random survey

Surface	µCi
Floors	403,679
Walls	194,293
Ceilings*	TBD
Inaccessible Areas*	N/A
Total Inventory	597,971

* TBD = to be determined. Ceilings are not expected to contribute significantly to the total inventory. Inventory for this portion of ceiling will be determined prior to building demolition as part of 776009.

4) Discussion:

Extensive decontamination efforts have been performed in the SRV and average contamination levels still exceed the ALARA goals for decontamination. The chip sampling of two locations on the floor and the 1"deep hydrolazing of the walls indicate that the decontamination methods currently being used are not the appropriate method for achieving an adequate level of decontamination in 776005. Hydrolazing the entire lower portion of the SRV to a depth of two inches would be a time consuming process that would generate thousands of gallons of liquid wastes. Even after such an effort it is not certain that the remaining levels would be low enough to meet all of the projects goals for ALARA and waste characterization.

All of the floors and walls should be removed as surface contaminated wastes prior to the demolition of B776/777. An ALARA evaluation detailing a proposed method is included in this report package.

5) Recommended Remediation

The SRV walls and floors should be demolished in containment prior to the demolition of B776/777. For details, see section of report labeled "ALARA Evaluation".

6) Additional Surveys to be Performed

a) Surveys performed on surfaces after fixative is applied to determine if wastes can be disposed of as SCO II.

Estimate Data and Sodium Iodide Instrument Information

Survey Area:	V	Survey Unit:	776005	Survey Date(s):	06/26/04

Instrument Specifications

Instrument #	1	2
Meter Model:	Ludlum 2350-1	N/A
Meter Serial #:	201184	N/A
Detector Model:	Ludlum 44-17	N/A
Detector #:	212344	N/A
Detector Size (cm^2):	17.8	N/A
Calibration Due Date:	11/10/04	N/A
Count Time (min)	0.5	N/A
Contact Efficiency	8.36%	N/A

Ratio Used

Pu to Am - 241	8.1

Comments

Activity per gram calculated by assuming most highly contaminated layer is 1 cm thick and concrete in that layer is 2.34 g/cc

Three 1/2" deep floor samples were taken and analyzed with High purity germanium. Sample locations were measured with NaI prior to sampling.
NaI data and floor samples confirm the validity of the above assumption used to convert NaI to nCi/g.

Attenuation Factors: Wet surface provides thin coating. Averaging surface contamination levels over top 1 cm is conservative.

Background (Gross)

Instrument #	1	2
Gamma (Ceilings)	109	N/A
Gamma (Floors)	109	N/A
Gamma (Walls)	109	N/A

Background (cpm)

Instrument #	1	2
Gamma (Ceilings)	218	N/A
Gamma (Floors)	218	N/A
Gamma (Walls)	218	N/A

Efficiencies (cpm/dpm)

Instrument #	1	2
Thin/No Paint	0.083	N/A
Epoxy	0.067	N/A
Other	0.079	N/A

Coatings	Thickness (inches)
Thin/No Paint	0.015
Epoxy	0.250
Other	0.06

Total Alpha Summary

	(dpm/100cm2)
Minimum:	159,898
Maximum:	231,596,861
Mean:	56,792,923
Std Deviation:	59,336,538

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Total Activity Estimates Using Sodium Iodide Instruments

Survey Area:	V	Survey Unit:	776005	Survey Date(s):	06/26/04

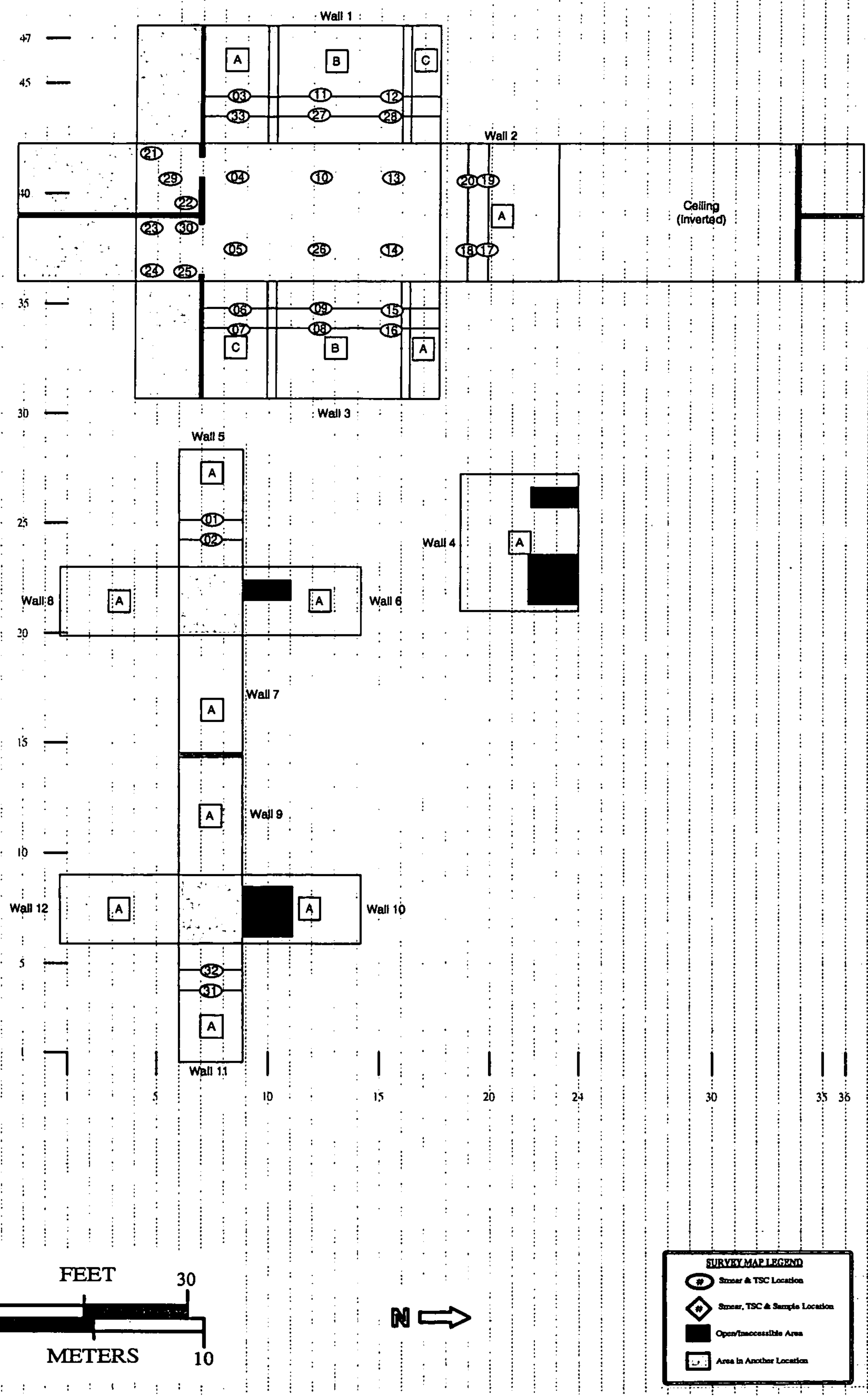
Sample Location #	Elevation (ft)	Instrument #	Gross Counts	nCi/g in top 1 cm	Total Alpha (dpm/100cm2)
1	8	1	254	0.31	159,898
2	4	1	359	0.53	275,687
3	8	1	2,683	5.46	2,838,473
4	0	1	59,345	125.75	65,322,361
5	0	1	33,264	70.38	36,561,599
6	4	1	85,150	180.52	93,778,765
7	8	1	11,901	25.03	13,003,601
8	8	1	11,707	24.62	12,789,668
9	4	1	95,937	203.42	105,674,104
10	0	1	86,801	184.03	95,599,401
11	4	1	3,476	7.15	3,712,951
12	8	1	39,140	82.85	43,041,344
13	0	1	53,135	112.56	58,474,298
14	0	1	210,127	445.82	231,596,861
15	4	1	42,244	89.44	46,464,273
16	8	1	20,053	42.34	21,993,200
17	8	1	15,132	31.89	16,566,578
18	4	1	110,127	233.55	121,322,094
19	8	1	64,423	136.53	70,922,114
20	4	1	133,016	282.13	146,562,885
21	0	1	5,542	11.53	5,991,228
22	0	1	31,973	67.64	35,137,952
23	0	1	162,821	345.40	179,430,280
24	0	1	177,704	377.00	195,842,473
25	0	1	180,947	383.88	199,418,684
26	0	1	184,481	391.38	203,315,794
27	4	1	17,183	36.24	18,828,314
28	4	1	142,668	302.62	157,206,606
29	0	1	18,394	38.82	20,163,741
30	0	1	227,887	483.53	251,181,660
31	8	1	1184	2.28	1,185,454
32	4	1	2148	4.33	2,248,503
33	4	1	34808	73.66	38,264,242

RADIOLOGICAL CLOSEOUT SURVEY FOR THE 776 CLUSTER

Survey Area: 5 **Survey Unit: 776005** **Classification: NA**
Building: 776
Survey Unit Description: First floor (SRV)

Total Floor Area: 85 sq. m **Total Area: 464 sq. m** **Grid Size: 3 x 3 sq.m**

SURVEY UNIT 776005 - MAP 1 OF 1



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Building 776 Size Reduction Vault (SRV)
ALARA Evaluation
7/26/2004

Scope

The building 776 size reduction vault (SRV) will be mechanically demolished using a small excavator equipped with interchangeable attachments (figure 1), a wire saw and standard hand operated D&D size reduction equipment. The excavator will operate within a soft sided containment built around the SRV and the environment inside the tent will be monitored for airborne radiation that may be released during demolition.

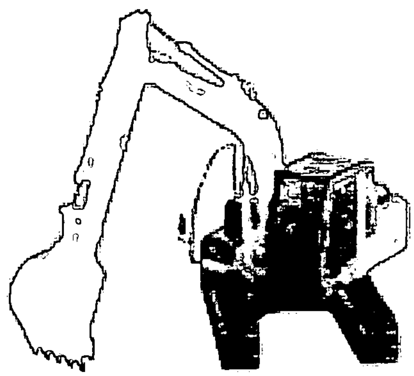

Figure 1: Hitachi ZAXIS 120 multi-function excavator

This ALARA Job Review (AJR) governs the demolition of the SRV floors and walls to include:

- Size reduction of structural components using standard D&D size reduction equipment and a wire saw as well as a small excavator with interchangeable attachments including a bucket with thumb, a hydraulic hammer and a shear.
- Removal of doors and components within the SRV.
- Application of a fixative coating to reduce airborne contamination levels prior to and during demolition activities.
- Waste characterization and packaging during and after demolition activities.
- Decontamination of equipment.

History

The SRV is a 45' by 20' rebar reinforced poured concrete vault (room 146) and two internal 10' by 10' rooms constructed of masonry block (rooms 146A and 146B). Room 146 is part of the original construction of building 776 and was used as a Plutonium storage vault until the 1969 fire. During the fire cleanup the

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vault was used for cleaning and size reducing contaminated equipment and rooms 146A and 146B were added to the south end of the vault. After completion of fire cleanup activities the SRV was used for container repackaging, washing leaded gloves and metal equipment in a ball mill, crushing HEPA filters and empty drums in a drum crusher and consolidating wastes into crates. All post 1969 operations conducted in the SRV were performed in supplied breathing air garments.

As a result of the processes that took place in the SRV all surfaces within the vault became highly contaminated. Surface measurements collected within the SRV during initial characterization were as high as 198,226,372 dpm/100 cm^2 total alpha. Due to these high contamination levels, traditional decontamination practices would not be possible while maintaining ALARA principles.

During May and June of 2004 remediation of the highly contaminated walls of the SRV was attempted using a hydrolaser. The hydrolaser uses very high-pressure water to etch away the contaminated concrete surfaces at a fraction of an inch per application. The entire floor and wall surface of the SRV was hydrolased to a depth of approximately one half of an inch with some areas up to one inch, requiring approximately three passes over the entire room and taking six weeks. While reducing the contamination levels of the SRV considerably, hydrolasing has been ineffective at reducing contamination levels low enough to meet release criteria while maintaining ALARA goals.

Expected Conditions

Estimates for the volume of respirable dust have been extracted from a previously processed document entitled "Estimates of Airborne Particulate Matter from Building 881 Implosion" (Haynes, 2004). This document uses an estimate of 3.39 mg/m^3 (8-hour TWA) respirable dust from building demolition. The value was derived from air samples collected during demolition of a pair of multiple story tenement buildings (Klitzman, 1994). A respirable dust load of 3.39 mg/m^3 is considered to be a conservative estimate considering that there was no ventilation when the samples were collected. Respirable dust to personnel inside the soft sided containment is expected to be no greater than 3.39 mg/m^3 8-hour time weighted average.

Media samples collected after the completion of hydrolasing to a depth of one inch deep contained up to 395,013 pCi/g total alpha. This level of contamination imbedded in the concrete has the potential to be released as airborne contamination during demolition of the walls. 395,013 pCi/g total alpha contamination converts into 229 DAC (formula 1) with no respiratory protection. 229 DAC can be converted to a total person-rem of 55,321 mrem (formula 4) for the job. A powered air purifying respirator used in a 229 DAC environment reduces the effective DAC to the worker to 0.229 DAC (formula 3). With the use of a powered air purifying respirator and an airborne contamination level of 0.229 DAC, a total person-rem of 55 mrem (formula 6) is estimated based on the total alpha measurements. Exposure to the operator will be reduced further due to the application of fixative and HEPA filtered ventilation in place on the excavator.

NaI measurements collected after the third hydrolasing pass show total contamination levels on the walls of the SRV to have a mean activity of 67,553,966 dpm/100cm^2.

Removable contamination surveys show contamination levels up to 283,000 dpm/100cm^2 in the SRV. The SRV is posted as an HCA.

Radiation dose rate surveys taken in the SRV record a dose rate of 0.017 to 0.020 mrem/hr.

The areas around the SRV (Rooms 134 and 144) are posted as Contamination Areas / Airborne Radioactivity Areas. Removable contamination levels are less than 2000 dpm/100cm^2 in these areas. Airborne contamination levels are typically less than 0.3 DAC. The area is posted as an ARA as a precautionary measure. Radiation levels in the area surrounding the SRV are 0.017 to 0.020 mrem/hr.

<u>Formula 1</u>: Conversion of total alpha activity to DAC with no fixative applied and no respiratory protection.

$$\frac{395{,}013\ \text{pCi}}{1\ \text{g}} \Big| \frac{1\ \text{g}}{1000\ \text{mg}} \Big| \frac{3.39\ \text{mg}}{1\ \text{m}^3} \Big| \frac{1\ \text{DAC}}{13\ \text{dpm}} \Big| \frac{1\ \text{m}^3}{} \Big| \frac{2.22\ \text{dpm}}{1\ \text{pCi}} = 228.676\ \text{DAC}$$

*Assumes airborne dust concentrations of 3.39 mg per cubic meter of air (Klitzman, 1994).
*Assumes class Y weapons grade plutonium (13 dpm/m^3/DAC).

<u>Formula 2</u>: Conversion of total alpha activity to DAC with no fixative applied and air purifying respirator.

$$\frac{395{,}013\ \text{pCi}}{1\ \text{g}} \Big| \frac{1\ \text{g}}{1000\ \text{mg}} \Big| \frac{3.39\ \text{mg}}{1\ \text{m}^3} \Big| \frac{1\ \text{DAC}}{13\ \text{dpm}} \Big| \frac{1\ \text{m}^3}{} \Big| \frac{2.22\ \text{dpm}}{1\ \text{pCi}} \Big| \frac{\text{PF}\ .02}{} = 4.574\ \text{DAC}$$

*Assumes airborne dust concentrations of 3.39 mg per cubic meter of air (Klitzman, 1994).
*Assumes class Y weapons grade plutonium (13 dpm/ m^3/DAC).
*Assumes protection factor of 50 (multiplier of 0.02) for air purifying respirator.

<u>Formula 3</u>: Conversion of total alpha activity to DAC with no fixative applied and powered air purifying respirator.

$$\frac{395{,}013\ \text{pCi}}{1\ \text{g}} \Big| \frac{1\ \text{g}}{1000\ \text{mg}} \Big| \frac{3.39\ \text{mg}}{1\ \text{m}^3} \Big| \frac{1\ \text{DAC}}{13\ \text{dpm}} \Big| \frac{1\ \text{m}^3}{} \Big| \frac{2.22\ \text{dpm}}{1\ \text{pCi}} \Big| \frac{\text{PF}\ .001}{} = 0.229\ \text{DAC}$$

*Assumes airborne dust concentrations of 3.39 mg per cubic meter of air (Klitzman, 1994).
*Assumes class Y weapons grade plutonium (13 dpm/ m^3/DAC).
*Assumes protection factor of 1000 (multiplier of 0.001) for powered air purifying respirator.

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Table 1: Estimate of job man-hours for dose estimating

Task	Estimated Man-Hours of Task
Demo concrete walls (192 hammer drilled holes @ 12 min each)	38.4 man-hours
Demo masonry block walls (approximately 290 ft^2)	2 man-hours
Wire saw north concrete wall (set-up and cut)	80 man-hours
Load out Rubble from floor	5.8 man-hours
Load out LSA rubble (64 IP-II's @ 15 min. & 4,000 lbs. each)	16 man-hours
Clean up tent (2 workers)	6 man-hours
RCT coverage (1 RCT @ 1 hr/day for 4.1 weeks)	24.6 man-hours
Estimated total man-hours	172.8 man-hours

Formula 4: Conversion of DAC-hr to dose (mrem) assuming no fixative and no respiratory protection.

1 DAC-hr = 1.4 mrem

(228.676 DAC)(172.8 hr)(1.4 mrem) = 55,321 mrem

*1 DAC-hr = 1.4 mrem (Bianconi, 1998).

Formula 5: Conversion of DAC-hr to dose (mrem) assuming no fixative and use of an air purifying respirator (APR).

1 DAC-hr = 1.4 mrem

(4.574 DAC)(172.8 hr)(1.4 mrem) = 1,107 mrem

* 1 DAC-hr = 1.4 mrem (Bianconi, 1998)

Formula 6: Conversion of DAC-hr to dose (mrem) assuming no fixative and use of a powered air purifying respirator (PAPR).

1 DAC-hr = 1.4 mrem

(0.229 DAC)(172.8 hr)(1.4 mrem) = 55 mrem

* 1 DAC-hr = 1.4 mrem (Bianconi, 1998)

Radiological Concerns / Potential Hazard Identification

The primary radionuclide of concern in building 776 is Weapons Grade Plutonium. Weapons Grade Plutonium is an alpha emitter, which is most dangerous when inhaled. During demolition of the concrete walls and floor large amounts of weapons grade plutonium are expected to be released into the air, making airborne contamination the highest priority concern during D&D of the

SRV. The operation of an excavator within the soft sided containment adds an additional hazard to the job. The excavator could very easily breach the walls of the tent, releasing airborne contamination into other parts of building 776.

The use of liquid dust suppression during demolition could alleviate some of the risk caused by airborne contamination, but it also presents an additional hazard. When using liquids for dust suppression there is potential for contaminated liquids to soak through personal protective equipment and come into contact with workers skin.

The concrete walls of the SRV are formed concrete, and are braced with steel rebar. During demolition of the concrete the rebar will be sheared so that the debris can be managed. This will leave large amounts of sharp steel rebar protruding from the rubble pile. Manual handling of debris will be minimized with the use of the excavator but there will be a high risk of injection for workers that handling the remaining debris.

Pre-Work Activities

Rad. Operations

Radiological Engineering shall design a soft sided containment (figure 2) that will contain airborne contamination released during the demolition of the SRV. The tent shall be large enough to facilitate the use of the excavator within the tent, giving enough room for the excavator to operate effectively with minimal risk of breaching the tent. Manufacturer recommendations call for at least 12,000 cfm of circulating airflow for a ZAXIS 120 excavator to perform optimally. These recommendations should be considered during design of the tent. The operators designated to perform the demolition should also be consulted during design of the tent.

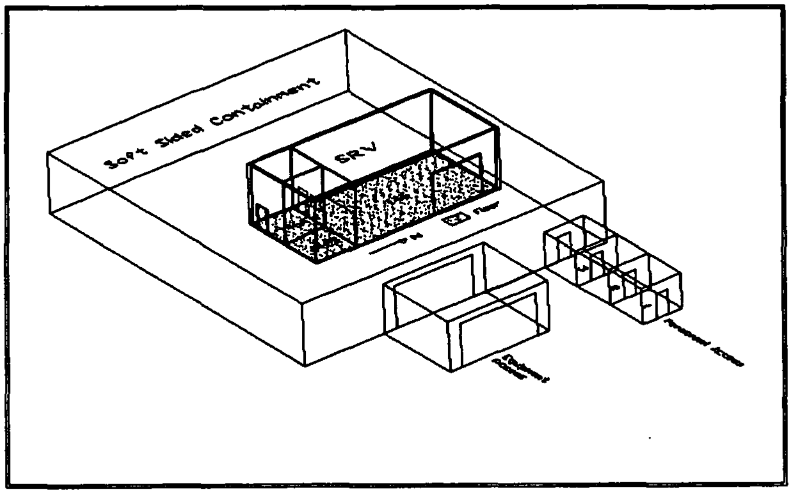

Figure 2: Conceptual drawing of soft sided containment surrounding the SRV.

ams Power

A soft sided containment shall be built surrounding the SRV. The tent shall be built according to specifications dictated by Radiological Engineering.

K-H D&D	A fixative shall be applied to all surfaces to be demolished prior to the start of any demolition activities. Fixative will reduce the potential for release of additional airborne contamination into the soft sided containment.
Rad. Operations	An evaluation should be performed to determine if there is a need for controls to limit the spread of contamination onto areas within the tent that will not be demolished. Controls may include placing steel sheeting over the floors outside of the SRV that the excavator will be operating on. This could prevent the spread of contamination to areas that have been previously remediated.
Rad. Operations	An evaluation should be performed to determine if the excavator can be prepared to minimize internal contamination of the equipment. This may include placing HEPA filters over air intakes and taking measures to reduce the introduction of contamination into inaccessible areas of the machine. These measures will reduce the potential of exposure to the operator.
Rad. Operations	Airflow pattern testing shall be performed in accordance with 3-PRO-109-RSP-04.03 "Placement of Air Monitoring Equipment" to verify the integrity of the containment and provide data for placement of air monitoring equipment. The soft sided containment must be inspected shiftly and weekly in accordance with PRO-405-RSP-01.03 "Soft Sided Containment". The inspection will include airflow testing each shift to ensure that at least 50 lfpm of air is moving through the door opening.
Rad. Operations	Water and ABC or equivalent fixative shall be used for dust suppression during demolition activities. Equipment required to facilitate the misting of the concrete rubble for dust suppression (figure 3) shall be staged and proven operational.

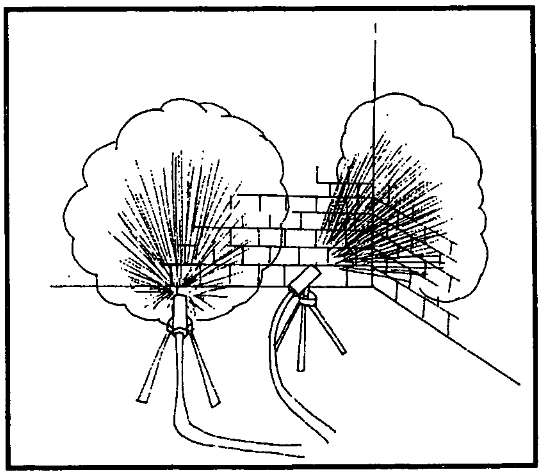

Figure 3: Conceptual drawing of possible dust suppression equipment.

Building 776 Size Reduction Vault (SRV)
ALARA Evaluation
7/26/2004

Rad. Operations — Airborne contamination monitoring instrumentation (CAMs and Lo-Vols) shall be placed according to data gathered during smoke testing and 3-PRO-109-RSP-04.03 "Placement of Air Monitoring Equipment " and proven operational.

OS&IH — During the initial entry into the soft sided containment support workers will be required to wear water resistant Saranex coveralls. OS&IH will perform an evaluation according to Standing Order 102, Revision 1, "Guidelines for Optimizing Protection of Workers form Contamination and Heat Stress" to determine limitations of personal protective equipment due to heat stress.

K-H D&D — A Pre-Evolution Briefing shall be conducted prior to each shift involving demolition activities in the SRV. Specific hazards and conditions should be discussed.

Engineering/Work/Administrative Controls

Engineering Controls

1. A soft sided containment will serve as containment around the SRV. A sufficient number of HEPA filtered exhaust air movers will be attached to the tent to provide negative pressure to the tent and provide for 50 lfpm of airflow through the entrance into the containment. Airflow will be set to maintain less than 3.39 mg/m^3 dust loading inside the containment. Negative pressure on the tent will minimize the risk of airborne contamination escaping from the tent. Less than 3.39 mg/m^3 dust loading inside the containment will reduce the likelihood of over exposure to airborne contamination by preventing the accumulation of airborne contamination during demolition activities.

2. Water and ABC or equivalent fixative will be used for dust suppression. Dust suppression will minimize the spread of airborne contamination during demolition.

Work Controls

1. A fixative shall be applied to all surfaces of the SRV prior to demolition. The fixative will reduce the amount of contamination available to be introduced into the air within the tent and will therefore reduce the amount of airborne exposure.

2. Material being demolished shall be misted with liquid to suppress dust. Dust suppression will reduce the amount of contamination available to be introduced into the air and will therefore reduce the amount of airborne exposure.

3. Debris shall be removed using engineering controls such as localized ventilation, misting with liquid and applying fixative to prevent the spread of airborne contamination.

4. Full time Radiological Control Technician (RCT) coverage is required during demolition activities and as specified by Radiological Safety (RS) supervision.

5. Sharp points of exposed rebar that will be handled manually shall be taped over to reduce the potential of injection.

Administrative Controls

1. Real time air monitoring shall be performed in the soft sided containment while support work is being performed using CAMs or low volume air samplers. CAMs shall be set to alarm at no greater than 400 DAC to provide a conservative alarm to warn personnel of changing conditions. During demolition dust loading will impact CAM air monitors. During demolition when there are no support workers in the soft sided containment CAMs may be turned off. While the CAMs are turned off the excavator operator will be monitored with a lapel sampler. Low volume air samplers should not be used unless CAMs are inoperable.

2. DAC-hr tracking shall be performed by RCTs for personnel when PAPRs are worn in accordance with 3-PRO-160-RSP-04.02, "Air Sampling".

3. Contamination and airborne contamination surveys shall be performed pre and post demolition activities.

4. One or more CAMs as determined by Radiological Engineering shall be positioned outside of the soft sided containment in a location that is likely to detect the presence of airborne contamination that has escaped the tent. The positions of the CAMs will be determined according to information gathered during the pre-work smoke tests. CAMs will be placed in the doffing area, carport and at the HEPA exhaust at a minimum.

Waste Characterization

Waste characterization of the SRV has identified 126 linear feet of concrete wall and 24 linear feet of masonry block wall to be demolished. The characterization calculates 2,234 ft^3 of material at a weight of 297,882 lbs..

The floors and walls are characterized as Surface Contamination II (SCO II) wastes and will be packaged in IP-2 containers. An estimated 75 IP-2 containers will be required assuming 4,000 lbs. per IP-2.

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Personal Protective Equipment

1. Due to the potential of DAC levels inside the tent exceeding 50 DAC, personnel entering the soft sided containment shall wear Powered Air Purifying Respirators (PAPR).

2. Removable contamination inside the SRV has been measured at levels up to 280,000 dpm/100cm^2. The soft sided containment shall be posted as a High Contamination Area. Workers (other than the excavator operator while inside the excavator) entering the soft sided containment shall wear a minimum of one full set of anti-C clothing (cotton coveralls, hood, inner gloves, rubber gloves, shoe covers and rubber booties) and a second outer set of coveralls, rubber gloves and booties. The outer set of coveralls may be cotton or a water-resistant coverall such as Saranex. OS&IH will determine the extent of use water-resistant coveralls according to the pre-work evaluation performed to comply with Standing Order 102, Revision 1, "Guidelines for Optimizing Protection of Workers form Contamination and Heat Stress".

3. The excavator operator shall wear a minimum of one full set of anti-C clothing (cotton coveralls, hood, inner gloves, rubber gloves, shoe covers and rubber booties). The sealed excavator cab will provide sufficient protection so that the operator will not be working in an HCA.

4. Standard radiological practices require workers that may be exposed to liquid contamination to wear water-resistant PPE. Personnel entering the soft sided containment during demolition activities that include the use dust suppression shall wear Saranex suits as a second layer of PPE. This requirement must be balanced with the high potential for heat stress in the area. If heat stress is determined to be a probability by OS&IH then alternatives to this requirement will be evaluated.

5. Personnel handling concrete with exposed rebar shall wear Kevlar glove liners to reduce the potential of injection.

Suspension Guideline Limits/ Radiological Hold-Points

Airborne Radioactivity

1. PAPRs are required during entry into the soft sided containment. Entry into the containment will not be allowed when the airborne contamination levels exceed 500 DAC.

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2. A 400 DAC-hr CAM will be operating inside the carport. After completion of demolition activities the excavator operator shall move the excavator into the carport and the inner door will be closed by RCT personnel. The operator shall not exit the excavator in the case of a CAM alarm until the CAM has been cleared or in case of emergency.

Special Requirements

1. Removable contamination surveys shall be performed in the soft sided containment daily by an RCT. This survey will determine if there is a need for additional applications of fixative to maintain ALARA goals.

2. The excavator shall park in the soft sided containment carport at the end of each evolution. Plastic sheeting shall be laid down on the floor of the carport before the excavator enters the carport to prevent contamination of the carport floor. RCT personnel will close the inner carport door after the excavator is turned off. RCTs shall wipe down the exterior of the excavator door using wet methods before the operator is allowed to exit the excavator. These measures will reduce unnecessary exposures to RCT personnel and the excavator operator.

References

1. Bianconi, C., 1998. *Technical Basis Document 00002, "The Use of Respiratory Respiration Devices in Radiological Atmospheres".* Rocky Flats Environmental Technology Site. Golden, CO.

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3. Klitzman, S., Goldberg, M. and Olmstead, E., 1994. *"Health Hazards to Construction Workers During the Demolition of Two Tenement Buildings".* Published by The Center to Protect Worker's Rights, November 1994. Silver Spring, MD.

Building 776 Size Reduction Vault (SRV)
ALARA Evaluation
7/26/2004

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